Stratospheric Observatory for Infrared Astronomy

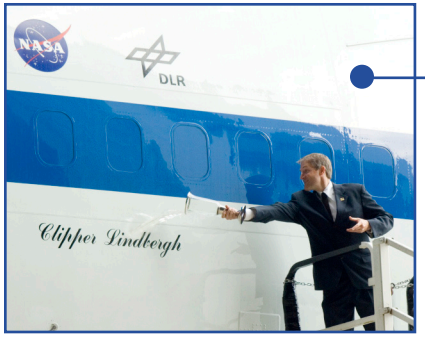
www.sofia.usra.edu

Aircraft Facts

Model: Boeing 747SP (Special Performance)
Number built: 45; still in service: 14
Registration: N747NA
Manufacturer's serial number: 21441
Line number: 306
Based: NASA Dryden Aircraft Operations Facility (Site 9), Palmdale, Calif.
Staffing: Flight Crew: 3; Mission Crew: 2–6; Observers/Educators: 5–15
Fuselage Length: 177 feet (53.9 meters) Standard 747-400: 232 feet (70.5 meters)
Wingspan: 196 feet (59.7 meters)
Powerplants: 4 x Pratt & Whitney JT9D-7J turbofan engines (50,000 lbf thrust each)
Service Ceiling: 45,000 feet (13.7 km) — above 99.8 percent of the Earth's atmospheric water vapor
Airspeed at 41,000 feet: 450 knots (Mach 0.8 or 520 mph)
Range: 6,625 nautical miles
Mission Duration: 7 to 9 hours (standard); 12.2 hours (maximum)
SOFIA empty weight (zero fuel): 378,000 pounds (189 short tons or 171,458 kg)
SOFIA Maximum Take Off Weight: 696,000 pounds (348 short tons or 315,700 kg)
Maximum Fuel Load: 300,000 pounds (44,776 U.S. gallons)
Fuel Usage: 150,000 to 250,000 pounds (standard duration mission)
Cavity Door weight: 3,150 pounds (1,430 kg)

NASA / Carla Thomas

NASA / Tom Tschida



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N747NA History

First Flight: April 25, 1977
Delivered: May 6, 1977, Pan Am (N536PA)
Christened: *Clipper Lindbergh* by Anne Morrow Lindbergh on May 20, 1977, the 50th anniversary of Charles A. Lindbergh's solo flight across the Atlantic.
- Rechristened *Clipper Lindbergh* by Erik Lindbergh on May 21, 2007.

Sold to United Air Lines: February 13, 1986
Registration changed: November 1, 1986 (N145UA)
Approximate Total Flight Hours: 74,500
Approximate Number of Cycles: 10,600
Acquired by NASA: October 27, 1997
Registration changed: December 17, 2004 (N747NA)
First post-modification flight: April 26, 2007 (Waco, Texas)
First 100-percent open door flight: December 18, 2009
First Light flight: May 25/26, 2010
Completion of envelope expansion flights: August 4, 2010

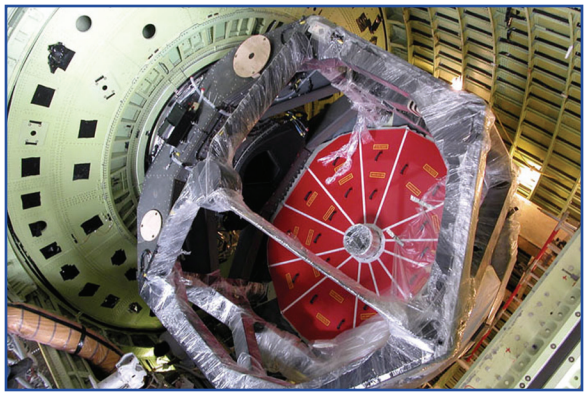
Telescope Facts

Telescope Consortium: MAN Technologie AG and Kayser-Threde GmbH
Nominal Operational Wavelength Range: 0.3 to 1600 microns
Primary Mirror Diameter: 2.7 meters
System Clear Aperture Diameter: 2.5 meters
Nominal System f-ratio: 19.6
Primary Mirror f-ratio: 1.28
Full Elevation Range: +15 to +70 degress above the horizon
Unvignetted Elevation Range: +20 to +60 degrees
Unvignetted Field-of-View Diameter: 8 arcmin
Maximum Chop Throw on Sky: +/-4 arcmin (unvignetted)
Diffraction-Limited Wavelengths: >/=15 microns
Telescope installation weight: 17 tons (34,000 pounds)

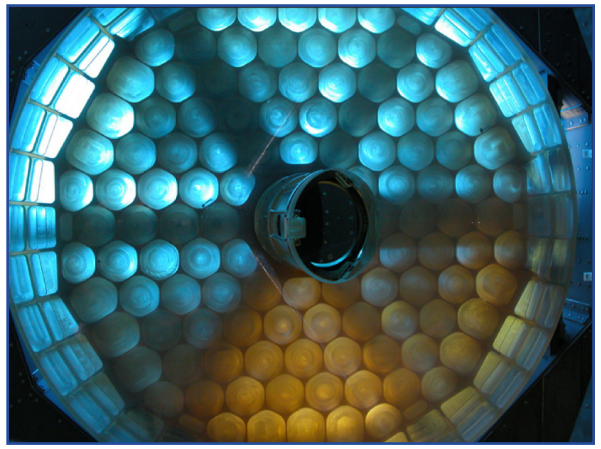
Optical Information

Optical Configuration: Bent Cassegrain with chopping secondary mirror and flat folding tertiary, Nasmyth focus
Chopper Frequencies: 1 to 20 Hz for 2-point square wave chop
Pointing Stability = 1.0" rms at first light
≤ 0.5" rms in full operations≤
Pointing Accuracy = 0.5" with on-axis focal plane tracking
= 3" with on-axis fine-field tracking
Total Emissivity of Telescope (Goal):
15 percent at 10 microns with dichroic tertiary
10 percent at 10 microns with aluminized tertiary
Recovery Air Temperature in Cavity (and optics temperature) = 240 K

www.nasa.gov/mission_pages/SOFIA
www.sofia.usra.edu
www.dsi.uni-stuttgart.de



L-3 Communications / USRA



NASA / Ron Strong

SOFIA Science Themes

Interstellar medium physics and star formation in our galaxy.
Planet formation in nearby star systems.
Origin and evolution of biogenic atoms, molecules, and solids.
Composition and structure of comets, planetary atmospheres and rings, star formation, dynamics, and interstellar medium chemistry of other galaxies.
The dynamic activity in the center of the Milky Way.
Ultra-luminous IR Galaxies (ULIRGS) as a key component of the early universe.

SOFIA Management

Aircraft Operations: NASA Dryden Flight Research Center, Edwards, Calif.
Science Operations: NASA Ames Research Center and Universities Space Research Association
Deutsches Zentrum fur Luft- und Raumfahrt (DLR)
Deutsches SOFIA Institut (DSI), Universität Stuttgart, Germany